

Code of Practice for

School

Exempt Laboratories

HSNO CoP Draft 2

Code of Practice for School Exempt Laboratories

Preface

This Code of Practice is approved pursuant to Sections 78 and 79¹ of the Hazardous Substance and New Organisms Act. The Environmental Risk Management Authority (ERMA) has delegated the power to approve Codes of Practice to the Chief Executive of the Authority, and this Code is approved in accordance with that delegation. It is confirmed that the requirements of Sections 78 and 79 have been met.

This code has been developed by the New Zealand Association of Science Educators (NZASE) and is intended primarily for the use of school science laboratories. However, it may also be applied to other areas within schools that use hazardous substances for teaching purposes.

Notice of approval of this Code has been published in the Gazette dated XXXX.

Pursuant to Section 80(1)(a) of the Act, the Code may be inspected on request at the Wellington office of ERMA New Zealand or alternatively, can be downloaded free of charge from the ERMA New Zealand web-site or NZASE web-site. Pursuant to Section 80(1)(b) of the Act, a copy of the Code is available for purchase from ERMA New Zealand at a price of \$15.

Approved this day of XXXX.

XXXX

Chief Executive

¹ Sections 78 & 79 empower the Authority to issue, amend or revoke codes of practice to implement Regulations under the Act.

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Summary

This code provides practical guidance on how schools **should** comply with the Hazardous Substances and New Organisms Act and the Exempt Laboratory Regulations.

The code applies only to the small-scale use of hazardous substances in teaching or research.

The scope of the code and definitions are given in Section 1.

Section 2 discusses the management of laboratories. The key requirements are that:

Each school must appoint one (or more) member(s) of staff to be a “laboratory manager” who is in charge of hazardous substances in the laboratory areas of the school. The laboratory manager must be suitably qualified and the appointment must be in writing.

Parts of this role **may** be delegated to named individuals, for example other teaching staff are in charge of hazardous substances used in their classes; laboratory technicians **may** be in charge of keeping an inventory.

Examples of role descriptions are given in boxed sections within the text. The examples in the text **may** be edited to suit particular schools.

Section 3 lists procedures that schools **shall** adopt to ensure:

Security of hazardous substances. Laboratory and Prep Rooms **should** be locked when not supervised.

Suitable signs **should** be erected at the entrance to the laboratory and to inform emergency services of the type of hazard contained within particular areas.

Section 4 stipulates steps that should be taken to ensure the safety of teachers and students when hazardous substances are used for teaching. For example:

Some classes of substances are forbidden for use in schools (S4.2 and Appendix 1).

Some substances are forbidden for use in schools (Appendix 3).

A method is given to assess the hazard of new substances.

Section 5 lists the operational requirements for handling hazardous substances. For example:

Closed shoes and safety glasses **shall** be worn when handling corrosive substances.

Flammable liquids **shall** be stored safely.

Section 6 gives broad guidelines for the safe handling of general classes of hazardous substance.

The appendices list technical information, an inventory of allowable substances and other reference material.

1. About this Code

1.1 Introduction

Why have a code of practice?

The Hazardous Substances and New Organisms (HSNO) Act controls the use, transportation and storage of all hazardous substances in New Zealand. S33 of the Act provides that small scale use of hazardous substances for research and teaching is exempt from the provisions of the Act provided the use occurs in a laboratory that meets the prescribed requirements. The Ministry of Education clearly states², “This exemption applies to school laboratories. Such laboratories, however, must comply with the "Hazardous Substances (Exempt Laboratories) Regulations 2001.”

These prescribed requirements are set out in the Hazardous Substances (Exempt Laboratory) Regulations 2001. These regulations further refer to other regulations (for example Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations 2001. Although schools use limited quantities of hazardous substances for teaching, school personnel are unlikely to have the resources to independently comply with the provisions of the Act and Control Regulations.

How do schools find the prescribed requirements?

S78 of the HSNO Act provides that ERMA *may* approve Codes of Practice as a method of implementing any specified requirement included in the regulations. Codes of Practice *should* provide clear guidance for different users, and *may* be used as a defence in law in case of a breach of the HSNO Act Regulations.

The intention of this Code of Practice is to provide practical guidance on the steps schools *should* take in order to comply with relevant sections of the HSNO Act and Regulations. Schools *should* work through the Code of Practice and ensure that policies and procedures conform to the relevant sections of the code. A school that conforms with the Code of Practice *shall* be deemed to meet the requirements of part (a) of section 33 of the HSNO Act, and be in compliance with the Hazardous Substances (Exempt Laboratories) Regulations 2001.

Formal sections of the Code of Practice are indicated by the use of serif font (Times New Roman). The degree of conformance required is indicated by the words, *shall*, *should* and *may*, and are defined in Section 1.3. Means of conforming to formal statements are given either:

² The implications of the HSNO Act for property aspects of school laboratories. Ministry of Education 29 March 2005

- as notes in italics below the formal statement, or
- in boxed sections written in san serif font (Arial).

Schools are encouraged to use these sections by incorporating the boxed sections within school procedures and policies, adapting the language to suit the particular circumstances. An electronic version of the Code **may** be downloaded from the NZASE (www.nzase.org.nz) or the ERMA New Zealand website (www.ermanz.govt.nz).

However, the Code of Practice is not a teaching or science-safety manual. The Code of Practice is limited to compliance with the HSNO Act and Regulations and does not cover other potential hazards such as radioactivity, biohazards or health issues. As such, schools **should** use the information in the Code of Practice in conjunction with other documentation. For example Safety in Science. 2000: Ministry of Education, Wellington.

Most schools use a limited range of hazardous substances in small quantities. This simplifies the compliance and operational management issues. For example, schools **should** not store or use more than 10 Litres of class 3.1A flammable liquid. This is below the quantity that activates hazardous substance location requirements³. This does not imply that schools are exempt from controls; flammable liquids **shall** be stored in flammable liquids cabinets or appropriate dangerous goods stores that meet building regulations. Nor does the exemption preclude seeking technical advice from ERMA approved test certifiers. The limitations on quantity do mean that a location certificate is not required for small quantities of hazardous substance. The maximum quantities of each class of hazardous substance that **may** be stored in schools are listed in Table 1, Appendix 1.

An inventory of allowable substances is given in Appendix 2 Table 1. Schools do not have to purchase these substances, but **may** do so if the substances are required for teaching purposes, provided that the substances are handled in accordance with safe methods of use.

Where classes or hazard categories are referred to in this Code of Practice, they refer to the HSNO classification system⁴ unless another classification system is specified.

This document **shall** be updated or amended as necessary. If you consider amendments are required please advise the New Zealand Association of Science Educators.

³ As listed in the Hazardous Substances (Classes 1 to 5 Controls) 2001, as amended in 2004, (Table 4 of Schedule 3). See also Appendix 1.

⁴ ² Summary user guide to HSNO thresholds and classifications ER-UG--0-4-1- 6-01 **may** be downloaded from www.ermanz.govt.nz

1.2 Scope and Application

This Code of Practice is applicable to the use of hazardous substances in all New Zealand schools using hazardous substances for the teaching of science, technology or related subjects.

There are two categories of substances that *may* be used in schools exempt laboratories:

- ERMA-approved hazardous substances. These substances are listed in Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice, New Zealand Gazette Number 35⁵ or subsequent transfer notices.
- ERMA-unapproved hazardous substances.

The word *approved* has a different meaning from the amalgamated list of hazardous substances allowed by the Ministry of Education for use in schools (Appendix 2). Not all *ERMA-approved* substances *may* be used in schools, and some substances that *may* be used, are not *approved* by ERMA.

For clarity:

Approved (in italics) substances shall mean gazetted for use in New Zealand by ERMA.

Where a substance is forbidden for use in schools by the Ministry of Education, it will be referred to as a MOE-forbidden substance.

Where the substance is not forbidden for use in schools, then the substance will be referred to as a MOE-allowable substance.

This Code of Practice does NOT apply:

- a) To the storage and use of fuels or agricultural chemicals for grounds maintenance or schools operational purposes other than teaching.
- b) To any hazardous substance produced for sale, or used to produce any substance for sale.
- c) To any new substance created as part of original research within the school laboratory.
- d) If the use creates or involves a hazardous substance for which any application for approval has been declined for approval by the Environmental Risk Management Authority (ERMA).
- e) If the hazardous substance is being evaluated in field trials. Field trials are considered to be research in containment and are subject to section 31 of the HSNO Act.
- f) If the use of the substance creates or involves a persistent organic pollutant (as defined by the Stockholm Convention Amendment Act, 2003).

⁵ All NZ Gazettes are available in pdf format from www.dia.govt.nz. Enter the site and go to 2004/March /35

The definition of a laboratory (S1.3) is given a very broad meaning by the inclusion of the word “structure”. Any structure that:

- a) Can meet the design requirements for a laboratory.
- b) Is used for teaching.
- c) Uses hazardous substances.
- d) Can be managed as an exempt laboratory.

Therefore schools can use this code to organise the management of hazardous substances in art or technology rooms, horticulture classes, farm pens or wherever else teaching uses small quantities of hazardous substance.

1.3 Definitions

Act – means the Hazardous Substances and New Organisms (HSNO) Act 1996, referred to as the Act in this document.

Apparatus – Apparatus and equipment can be used interchangeably.

Approved hazardous substance – means a hazardous substance that has been granted an approval for release by the Environmental Risk Management Authority, and includes substances approved under Part V or Part 6A of the Act, and substances granted deemed approvals via the transfer process.

Authorised person in relation to an Exempt Laboratory – means any person authorised to enter the laboratory by the Laboratory Manager.

Bunding – Small retaining wall to contain liquid spills.

Classification System – means the classification system used in the Hazardous Substances (Classification) Regulations 2001, unless otherwise indicated.

Documentation – documentation *shall* be accorded its widest interpretation and includes electronic records.

Emergency response plan – means an emergency response plan referred to in Regulation 16 of the Hazardous Substances (Exempt Laboratories) Regulations 2001. These requirements are covered in section 5.3 of this Code of Practice entitled Emergency Response Plans.

Entrance in relation to a HSNO Laboratory Facility or Laboratory – means a door, gate, or passage that is a point of entry into the HSNO Laboratory Facility or Laboratory.

Equipment – Apparatus and equipment can be used interchangeably.

ERMA– means the Environmental Risk Management Authority.

Exempt laboratory – means a laboratory that meets the requirements of the Hazardous Substances (Exempt Laboratories) Regulations 2001. These facilities are generally a building (or a part thereof) that contains multiple laboratory rooms.

Fire Cell – Any space within a building, including a group of contiguous spaces on the same or different levels, which is enclosed by any combination of fire separations (as defined in clause A2 of the building code), external walls, roofs, and floors. A prep room and laboratory together would normally be one fire cell.

General Knowledge – means a knowledge of the hazards associated with each HSNO class of substance and general precautions required to mitigate these hazards.

General Technical Knowledge – means sufficient knowledge to carry out duties/responsibilities specified in this code of practice.

Hazardous Substance – means, unless expressly provided otherwise by regulations, any substance with one or more of the following intrinsic properties:

- Explosiveness
- Flammability
- A capacity to oxidise
- Corrosiveness
- Toxicity (including chronic toxicity)
- Ecotoxicity, with or without bioaccumulation; or
- which on contact with air or water (other than air or water where the temperature or pressure has been artificially increased or decreased) generates a substance with any one or more of the properties specified in this definition.

The Hazardous Substances (Minimum Degrees of Hazard) Regulations 2001 define what constitutes a hazardous substance for each hazardous property. There is a level below which a substance is not considered hazardous under this legislation.

*Note: Dilute hazardous substances **may** no longer meet the threshold for the particular hazardous property, that is, no longer hazardous.*

Laboratory – means a vehicle, room, building, or any other structure set aside for teaching science and equipped for scientific experiments or research.

Laboratory Manager – is responsible for one or more laboratories (rooms) and has specified duties and functions in respect to this Code of Practice.

Locking – means that a person can only enter the laboratory by using a tool, a key, or any other device used to operate a lock. This would include magnetic swipe cards, combination locks (including the push button type).

MOE-allowable – Any hazardous substance that is on the ERMA *approved* or *unapproved* list but isn't on the MOE-forbidden list of specific substances or forbidden classes.

MOE-forbidden – Any hazardous substance listed in Section 5.1 of Safety In Science, 2000: Ministry of Education or that meets any of the criteria listed in 4.2.2 of this code.

May – implies a discretionary statement.

Person in Charge – means a person delegated by a Laboratory Manager to have control and responsibility for hazardous substances in part or all of an exempt laboratory.

Place – place is not defined in the Act or Regulations except that it includes any vehicle, ship, aircraft or other means of transport. In the context of this Code of Practice, a place can range from a specific point in a room, to a group of rooms.

Pooling substance – means a Hazardous Substance that is in fluid form.

Requirements for disposal, in relation to a Hazardous Substance– means the relevant disposal controls described in this Code of Practice.

Safe Method of Use (SMU) – a method of use that meets the requirements of Section 6.

Safety Data Sheets (SDS) – Material Safety Data Sheets (MSDS).

School – means any place approved by the Ministry of Education for the teaching of science.

Secondary containment system, in relation to a place;

- means a system or systems in which pooling substances *shall* be contained if they escape from the container or containers in which they are being held; and
- from which they can, subject to unavoidable wastage, be recovered.

Secondary container – means any container into which any substance is poured, for example a class set of dilute acid.

Shall – implies a mandatory statement.

Should –implies an advisory statement.

Small container – means:

- a container in which a Hazardous Substance is being held before or during use in a laboratory, in quantities typically used for that purpose; and

- includes any laboratory equipment in which any Hazardous Substance remains after that use.

Storage cabinet – means a cabinet or cupboard, with close fitting door(s), intended for the storage of Hazardous Substances. Specific guidance on storage cabinet construction can be obtained from AS 2982 Laboratory Construction or AS 1940 Storage and handling of flammable and combustible liquids.

*Note: Schools are not expected to retain these standards but **should** purchase cabinets meeting the standards. A critical part of the design is that the cabinets have double walls and containment for spilt liquids.*

Substance means-

- Any element, defined mixture of elements, compounds, or defined mixture of compounds, either naturally occurring or produced synthetically, or any mixtures thereof;
- any isotope, allotrope, isomer, congener, radical, or ion of an element or compound which has been declared by the Authority, by notice in the Gazette, to be a different substance from that element or compound;
- any mixtures or combinations of any of the above;
- any manufactured article containing, incorporating, or including any Hazardous Substance with explosive properties.

Teacher – has the normal common-sense meaning

Teacher in Charge – means a teacher authorised by a Laboratory Manager to use hazardous substances to instruct students.

Threshold – means a level of hazardous property, for example flash point, pH, toxicity used to define the category for any hazardous class. (See ERMA Summary Guide to Hazardous Substances ER-UG-04-1).

Total pooling potential, in relation to a place, means the aggregate quantity of all pooling substances held in the place.

Unapproved hazardous substance – is a substance that does not have a HSNO approval, i.e it has not been approved by the Environmental Risk Management Authority for (general) use in New Zealand. However, such substances may be imported, manufactured or used by a laboratory that complies with the Exempt Laboratory Regulations, as provided by s33 of the HSNO Act.

2. Management of Laboratories

When a school uses hazardous substances in one or more areas of the school, for the purposes of teaching, these areas **shall be** classified as laboratories.

2.1 Appointment of Laboratory Managers by Board of Trustees/Governors

- a) The School Board of Trustees/Governors **shall** designate one or more, suitably qualified (see section 2.3), member(s) of staff to be Laboratory Manager(s).
- b) The terms and conditions of the designation **shall** be recorded in writing, and specify the areas under the control of the Laboratory Manager(s).

2.2 Laboratory Manager's responsibilities

- a) A Laboratory Manager (boxed section 2.1) **shall** have overall responsibility for the management of all Hazardous Substances contained within the designated area.
- b) **may** nominate any other appropriate person (technicians, other teachers, relievers) to be "in charge" in his or her absence (boxed section 2.2)
For example, one person may be nominated to be in charge of the DG store.
- c) **may** delegate some of their functions to "persons in charge" of a laboratory, but cannot delegate their responsibility.
The teacher in the room is in charge of all hazardous substances for the teaching period.
- d) **shall** ensure that the hazardous substances in the laboratory are under the direct supervision of a nominated person in charge whenever any person is in the designated area.
- e) **shall** ensure that hazardous substances in the designated area are secure at all times that the area is not directly supervised by a Laboratory Manager or Person in Charge.
For example, if a room is to be used by an extramural class, without the direct supervision of a nominated person, then all hazardous substances shall be secured.
- f) **shall** ensure that the provisions of this Code of Practice are adhered to. This includes the organization or delegation of emergency planning, inventory control and the implementation of safe methods of use for hazardous substances.
- g) **shall** ensure that approved and unapproved hazardous substances are handled and stored in the way required under the Hazardous Substances Control (Classes 1 to 5 Controls) and (Classes 6, 8 and 9 Controls) Regulations (see section 4 and 5).
For example, flammable liquids shall not be stored adjacent to oxidisers.
- h) **shall** ensure that appropriate Protective Equipment is available, and that such equipment is maintained (see section 5).
- i) **shall** ensure that information on the use and maintenance of equipment, as required in Section 5 is available to all persons using hazardous substances.
- j) **shall** ensure that procedures for the disposal of Hazardous Substances are included in the Laboratory Safety/Procedures manual or other appropriate documentation. The procedures **shall** comply with requirements specified in Appendix 6 of this code.

2.3 Skill and Knowledge Requirements for Laboratory Manager

A person designated as a Laboratory Manager **shall** have –

- a) a general technical knowledge⁶ of the physical and chemical properties of all substances used in the Laboratory for which they are responsible;
- b) a general knowledge of the precautions for handling those Hazardous Substances;
- c) a general knowledge of the disposal of those substances in accordance with this Code of Practice;
- d) a general knowledge of the most recent version of this code of practice.
Laboratory Managers or designated persons should read this code of practice.
- e) specific knowledge of emergency actions for their laboratory;
- f) specific knowledge of the correct operation and maintenance of equipment using hazardous substances;
- g) specific knowledge of where to find additional information that might be required to support general knowledge requirements.

A Safe Method of Use that meets the requirements specified in Section 6 of this code, for the categories of hazardous substances they are handling is sufficient information.

2.4 Skill and knowledge requirements for persons in charge

A person who is nominated to be “in charge” of a laboratory by a Laboratory Manager

- a) **shall** assume the responsibilities of the Laboratory Manager during the period they are in charge.
- b) A person designated as a “person in charge” **shall** have all the knowledge requirements of a Laboratory Manager, for the specific teaching session or laboratory under their charge.
- c) If a relieving teacher is required to handle hazardous substances, then the laboratory manager **shall** ensure that the relieving teacher has the appropriate skill and knowledge to handle the hazardous substances.

⁶ A New Zealand Certificate of Science Level 5, National Diploma in Science Level 6, Science degree or equivalent qualification that has included papers on physical chemical and toxic properties of the substances being handled, or at least five years laboratory experience, shall be regarded as sufficient general knowledge.

Example Role Description for School Laboratory Manager

Reporting to:

Principal (copy to Board of Trustees, Health and Safety Committee).

Scope of Role:

1. Designated person as manager of exempt laboratory under S33 of Hazardous Substances and New Organisms Act.
2. To co-ordinate hazardous substances management, (safe work policies and procedures) in a XXXX science laboratories
3. Delegate responsibility for laboratory management when LM is absent from the laboratory.

Responsibilities

- 1 Take all practicable steps to implement Exempt Laboratories Regulations.
- 2 Ensure that a classified inventory is kept of hazardous substances stored in the laboratory.
- 3 Ensure that the hazardous properties of any new substances brought into the school are checked.
- 4 Ensure information on emergency procedures, and paper copies of Safety Data Sheets for Category A and B hazardous substances are kept in a laboratory folder, which is readily available to all persons in the laboratory.
- 5 Ensure that persons in the laboratory are able to access hazardous substance information via the Internet or electronic format (if available) within reasonable time.
- 6 Ensure that all handling of hazardous substances complies with Class 1-5 and Class 6-9 control regulations.
- 7 Ensure that signs warning of the nature of hazards are posted at the entry of the laboratory that warn that only authorized persons are permitted inside the laboratory.
- 8 Ensure that hazardous substances are appropriately handled and stored in the laboratory. In particular:
 - Flammable goods shall be stored within a flammable goods cabinet.
 - Incompatible chemicals shall be segregated.
 - Appropriate Personal Protective Equipment is available (e.g. gloves safety glasses, lab coats).
 - Fume hoods shall not be used for storage.
 - Appropriate first aid material is available within the laboratory.
 - All containers of hazardous substances are labeled with name and concentration of the substance and a class icon indicating the nature of the hazard.
- 9 Ensure that procedures for disposal of hazardous substances comply with Hazardous Substance Disposal Regulations 2001.
- 10 Ensure visitors and contractors to the laboratory are aware of the hazardous substances in the laboratory and the emergency procedures to be followed.
- 11 Introduce new staff to the laboratory and the safety measures within the laboratory on their first day at work.
- 12 Ensure that all persons handling hazardous substances have appropriate training.

2.5 Duties of Persons Handling Hazardous Substances

- a) All persons handling hazardous substances **shall** comply with the requirements specified in this Code of Practice.
*In particular, persons **should** apply the Safe Methods of Use in Section 6.*
- b) Before introducing any new substance into a laboratory, the person intending to introduce the substance **shall** determine if the substance is hazardous and the Safe Methods of Use, Laboratory Safety Procedures or the Emergency Response Plan are appropriate to the substance.
See section 4 on how to check whether a substance is hazardous.
- c) If the substance is hazardous and the existing Safe Method of Use are not appropriate to control the substance, that person **shall** inform the Laboratory Manager and agree a safe method of use for that substance.
*The SMU **should** be in writing and signed off by the laboratory manager. A copy of email or requisition/order form can be considered a form of written notification*
- d) Prior to using any hazardous substance, the person handling the hazardous substance **shall** check actions required under the Laboratory's Emergency Response Plan in the event of an accident or accidental exposure to the substance.

Example Role for School Laboratory Technician

Reporting to:

Head of Department

Scope of Role:

Designated person in charge of prep-room in Block XX.

Responsibilities

- 1 Keep prep room locked in the absence of teaching or technical staff.
- 2 Keep an inventory of hazardous substances laboratory XX and the dry store.
- 3 Keep paper copies of Safety Data Sheets for Category A and B hazardous substances in a laboratory folder, so that persons are able to access the information.
- 4 Ensure that:
 - Flammable goods are stored within a flammable goods cabinet at the end of each day.
 - Incompatible chemicals are segregated.
 - That there are enough protective gloves, safety glasses, and other personal protective equipment for the next weeks work and the eye wash bottle water is changed at the beginning each week.
 - The fume hood is cleared of storage.
- 5 Ensure that procedures for disposal of hazardous substances comply with Hazardous Substance Disposal Regulations 2001.
- 6 Report all accidents to principal.
- 7 Conduct regular safety checks at appropriate intervals on significant hazards.
- 8 Report maintenance requirements to the Head of Department.

Example Role:

Teacher in charge of course work using hazardous substances

Reporting to:

Head of Department

Scope of Role:

Designated person in charge of year 13 chemistry projects.

Responsibilities

- 1 Check the hazardous properties for chemicals to be used by students.
- 2 Ensure that the procedures proposed are appropriate to the levels of skill of the students.
- 3 Ensure that the students and other users have read the Safe Methods of Use for the class of substances being used.
- 4 Ensure that appropriate safety equipment is available and used.
For example, the appropriate disposable gloves.
- 5 Ensure that the students and other users know where paper copies of Safety Data Sheets are kept and understand the information in the Safety Data Sheets.
- 6 Ensure that procedures for disposal of hazardous substances comply with Hazardous Substance Disposal Regulations 2001
- 7 Report all accidents to principal.

3. Security

3.1 Access

- a) The Laboratory Manager (or person in charge) of a laboratory **shall** ensure that hazardous substances in the laboratory are secured at all times when the laboratory is not directly supervised by a laboratory manager or person in charge (section 2.2(e) above) by:

- i. locking access to the room or area being used as a laboratory or containing hazardous substances; or
- ii. securing hazardous substances within a sub-area (e.g. prep room) or secure cabinet (e.g. lockable flammable liquids or corrosives cabinet.)

*Note: This requires that hazardous substances, for example concentrated acids, **shall not** be left out in an unsecured area.*

*In general, laboratories **should** be secured when not under direct supervision of a person in charge or authorised person.*

- b) Persons (such as visitors, cleaners, maintenance workers) **may** enter the laboratory without direct supervision provided:

- i. all such persons are made aware of the hazards associated with the hazardous substances that are in the area where they are to carry out their functions; and
- ii. they have been instructed in and understand the emergency procedures to follow; and
- iii. they are given written approval and instructions on the actions allowable within the laboratory.

*For example, the written instruction to the cleaners **may** state that they **should** empty waste paper bins and clean the floor in one room, but are forbidden from cleaning the prep room.*

- c) arrangements have been made to isolate such persons from the hazardous substances at the area.

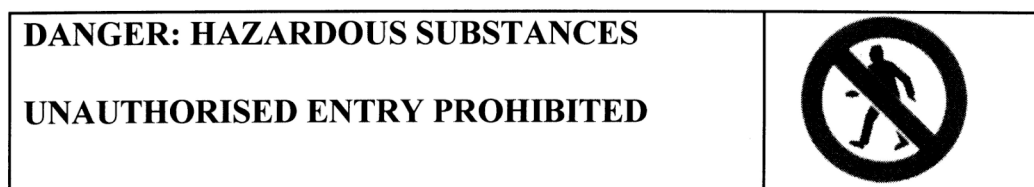
For example, locking hazardous substances in the flammable liquids, corrosives cabinet or prep room.

- d) Students **shall** not be present in a laboratory containing hazardous substances unless under direct supervision of a person in charge.

3.2 Signage

The Laboratory Manager **shall** ensure that all entrances to an area designated as a laboratory **shall** be marked with a sign stating that access is for authorised persons only, and indicating the nature of hazards within the laboratory.

*The example in boxed section 3.2 **should** be printed on a colour printer and blown up to a suitable size. The pictogram should be coloured red.*



Warning Sign to have white background, black lettering, with letters 50 mm high.

The pictogram **should** have a diameter of 100 mm.

4 Use of hazardous substances in teaching

For any teaching that requires the use of any substance, the teacher in charge **shall** take all practicable steps to establish the hazardous properties (if any) and classification of the substance.

*To decide if a substance **may** be used in a school, follow the key in the boxed section 4.1*

There are two general cases:

- Substances that are listed as MOE-allowable or MOE-forbidden in this code (Section 4.1 below).
- Substances that are not listed as MOE-allowable or MOE-forbidden in this code (Section 4.2 below).

4.1 Substances that are listed in this code of practice as MOE-allowable or MOE-forbidden for use in schools

- a) Substances that are listed in Appendix 2 **may** be used in schools with appropriate precautions.
- b) Substances of the classes listed in Appendix 3, Table 1 **shall not** be used or stored in schools unless they are listed in Appendix 2.
- c) Substances listed in Appendix 3 table 2, **shall not** be used or stored in schools.
- d) If the substance is classified as a hazardous substance under Hazardous Substance (Classification) Regulations 2001 (*there is a classification in column 3 of Table 1*) then the teacher in charge **shall** ensure that the substance is handled and stored in a manner which meets the applicable provisions of the Hazardous Substances (Classes 1 to 5 Controls) 2001 and Hazardous Substances (Class 6, 8 and 9 Controls) Regulations 2001.

An acceptable method of meeting these controls is to ensure that the substances are handled and stored in a way that meet the provisions of the Safe Methods of Use contained in Section 6 of this code.

*Note that more than one Safe Method of Use **should** be consulted for some substances. For example, Acetic Acid HSNO codes are 3.1B 6.1D 6.9B 8.1A 8.2B 8.3A 9.1D 9.3C in other words, flammable liquid, toxic substance, skin and eye corrosive, and ecotoxin. The most hazardous properties are flammability (during storage) and as a skin and eye corrosive in handling.*

- e) If the substance is not yet classified under Hazardous Substance (Classification) Regulations, but is a Dangerous Goods (Column 4 Table 2. Appendix 2, then the teacher in charge **shall** ensure that the substance is handled and stored in a manner which meets the applicable provisions of an equivalent substance under the Hazardous Substances (Classes 1 to 5 Controls) 2001 and Hazardous Substances (Class 6, 8 and 9 Controls Regulations) 2001.

For example, sodium oxalate is listed as Class 6.1,8 Dangerous Goods. In other

words, an acute poison and corrosive. Use the Safe Method of Use for HSNO Class 6 Toxic Substances and HSNO Class 8 corrosive substance.

- f) The teacher in charge **shall** ensure that secondary containers of the substance prepared for class use are labelled with:
- the identity of the hazardous substance.
 - the concentration of the hazardous substance.
 - an icon warning of the hazardous properties of the substance being used.
 - the concentration of the substance present.

See example under section 5.1.4. An acceptable method of labelling small containers shall be to affix a postage-stamp size icon (see appendix 5). If the container is smaller than this, e.g. test tube, a warning shall be fixed to the test tube rack or holding tray.

Boxed Section 4.1: Decision key to decide if substances can be used in schools

1 Is the substance on the allowable list in Table 1 Appendix 2?	Yes	Check the safe method of use for that class of substance.
	No	Go to 2.
2. Is the substance on the forbidden list Appendix 3?	Yes	It is forbidden to use the substance in schools.
	No	Go to 3.
3 Is the substance on the ERMA list of transferred substances? Read boxed section 4.2.1.	Yes	Follow box 4.2.1, and write down Classification. Go to 4.
	No	Follow box 4.2.2 and print off safety data sheet. Go to 5
4. Is the substance listed in any of the Classes in Table 1 Section 4.2.2?	Yes	It is forbidden to use the substance in schools.
	No	Classify the substance by completing the questionnaire in section 4.2.3.

4.2 Substances that are not on the list of MOE-allowed or MOE-forbidden substances for use in schools

If a substance is not listed as an allowed or forbidden hazardous substance (Appendices 2 and 3), the teacher in charge **shall** take all practicable steps to check the hazardous properties of the substance before its use, and comply with any requirements stipulated by the safe method of use for *MOE-allowed* hazardous substances with similar hazardous properties.

There are two general cases:

- *ERMA-approved*. means a hazardous substance that has been granted an approval for release by the Environmental Risk Management Authority, and includes substances approved under Part V or Part 6A of the Act, and substances granted deemed approvals via the transfer process.
- *ERMA-unapproved* means a substance that does not have a HSNO approval, i.e. it has not been approved by the Environmental Risk Management Authority for (general) use in New Zealand. However, such substances may be imported, manufactured or used by a laboratory that complies with the Exempt Laboratory Regulations, as provided by s33 of the HSNO Act..

4.2.1 ERMA-approved Substances

- a) In the first instance, the teacher **shall** check to see if the substance has been classified by ERMA NZ under the Hazardous Substance (Classification) Regulations 2001.
Use Box 4.2.1 on page 22.
- b) If the substance is approved by ERMA for use in New Zealand, but any of the classifications match the classification listed in Table 4.2 on page 24, then the substance **shall** not be used in schools.
- c) If the substance is approved by ERMA for use in New Zealand and the classification is not listed in Table 4.2 below, then the teacher in charge **shall** ensure that the substances is handled and stored in the same way as any substance of similar classification on the list of chemicals MOE approved for use in schools.
An acceptable method of meeting these controls is to ensure that the substances are handled and stored in a way that meet the provisions of the Safe Methods of Use contained in this code (Section 6).

Box 4.2.1

How to check if a substance is an ERMA-approved hazardous substance.

1. This information is available from ERMA New Zealand Register of approved hazardous substances at www.ermanz.govt.nz/search/substance1.cfm.
2. For example, sodium nitrite.
 - (i) Go to <http://www.ermanz.govt.nz/search/registers.html>.
 - (ii) Enter sodium nitrite in the hazardous substance box .
 - (iii) Click on the Hazardous Substance Button at the bottom of the page.
 - (iv) Press search.
3. Search results page.
Click on "Nitrous Acid, sodium salt".
4. Nitrous Acid Sodium Salt page:
Click on "Controls Word" or "Controls PDF".
5. This gives you the information page (HSR001286), which includes the CAS number, the HSNO classification, if approved or not. This document will tell you that sodium nitrite is an ERMA approved substance and has been classified as 5.1.1C, 6.1C, 6.4A, 6.6B, 6.9B, 9.1A, and 9.3B.
6. Check this classification against the summary table in ER-UG-04-1.
This will show that sodium nitrite is a mild oxidizer, an acute toxin, eye irritant, mutagen, aquatic ecotoxin and terrestrial vertebrate toxin.
7. Use the Safe Method of Use for Acute and Chronic toxins, and ensure that you dispose of the surplus substance appropriately.

4.2.2 ERMA-unapproved Substances

- a) If the substance is not yet classified under the Hazardous Substance (Classification) Regulations 2001, and the substance is not on the MOE list of substances approved for use in schools (Appendix 3), then the teacher in charge **shall** determine the likely classification under HSNO.

An acceptable method of determining the likely classification is to refer to a manufacturer's or publicly available Safety Data Sheets (SDS) and compare the manufacturers specifications of hazardous properties data with the Threshold Limits specified under the Hazardous Substance (Classification) Regulations 2001. This information can be found in Summary User Guide to HSNO Thresholds and Classifications ER-UG-0-4-1- 6-01 which can be downloaded from www.ermanz.govt.nz.

See Boxed Section 4.2.3 –Hazard assessment process

- b) The teacher in charge **shall** keep a paper copy of the SDS for the substance and hazard assessment in the laboratory or teaching folder. Any substance not on the list of chemicals allowable for use in schools, which would, if it were classified, meet the thresholds for the sub-classes and categories in Table 4.1 **shall** be forbidden for use in schools.
- c) For every substance that is not on the allowable list but **may** be used in schools, the teacher in charge **shall** ensure that the substance is handled and stored in the way in which a similar quantity of an allowable hazardous substance with similar hazardous properties is required to be handled under the Hazardous Substances (Classes 1 to 5 Controls) 2001 and Hazardous Substances Class 6,8 and 9 Controls Regulations 2001.

*An acceptable method of meeting these controls is to ensure that the substances are handled and stored in a way that meets the provisions of the Safe Methods of Use for the class of substance that would apply if the substance were classified. In other words, if a teacher wishes to use a substance that is not on the allowable list, they **should** classify the substance and ensure it is handled in a similar way to any other substance of the same classification.*

Box 4.2.2

How to find a safety data sheet on the internet.

Safety Data Sheets (SDS) should be available from your supplier. If you have difficulty in obtaining a SDS, safety information is available on the net.

For example, go to the International Labour Organisation (ILO) safety card site.

<http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/index.htm>

If you cannot find a safety card for a substance, go to the Safety Information and Resources Incorporated (SIRI) at:

<http://www.hazard.com/msds/index.php>.

You will also find information on the meaning of Risk and Safety Codes, Packing Group, UN Numbers and CAS numbers at SIRI and many other sites.

Table 4.2: HSNO Sub-classes and Categories of Hazardous substance that are forbidden from use in schools unless specifically listed in Appendix 2 as MOE-allowable hazardous substances.

Sub Class	Description	Categories
1.1	Mass explosion	all
1.2	Projection explosion	all
1.3	Fire and Minor blast	all
3.1	Flammable liquid	A
3.2	Liquid Desensitised Explosive	all
4.1.2	Self Reactive	all
4.2	Spontaneously combustible	A
4.3	Dangerous when wet	A
5.1.1	Liquid solid oxidisers	A
5.1.2	Gas oxidisers	A
5.2	Organic Peroxide	A and B
6.1	Acute Toxin	A
6.6	Mutagen	A
6.7	Carcinogen	A
6.8	Reproductive Developmental	A
6.9	Target organ systemic	A
8.2	Skin Corrosive	A
8.3	Eye Corrosive	A

Reference: ERMA Summary User Guide to HSNO thresholds and Classifications of Hazardous Substances ER-UG-04-I- 6-01

Note:

The classification of hazardous substances changes with dilution or modification. Table 4.3 shows different classifications for aqueous solutions of common corrosives.

*In many cases it **may** not be possible to accurately classify dilute solutions of hazardous substances. Teachers and laboratory managers **should** use their professional judgment, and err on the side of caution.*

Table 4.3. Examples of the classification for different aqueous solutions of corrosives

Sodium Hydroxide	Sulfuric Acid	Hydrochloric Acid	Nitric Acid
(>5%) 6.1D, 8.1A, 8.2B, 8.3A, 9.1D	(>10%) 6.1D, 6.7A, 6.9A, 8.1A, 8.2B, 8.3A, 9.1D	(>25%) 6.1B, 8.1A, 8.2B, 8.3A, 9.1D, 9.3C	(>70%) 5.1.1C, 6.1D, 6.9B, 8.1A, 8.2A, 8.3A, 9.1D
(2-5%) 6.1E, 8.1A, 8.2C, 8.3A	(5-10%) 6.1E, 6.9B, 8.1A, 8.2C, 8.3A, 9.1D	(10-25%) 6.1D, 8.1A, 8.2B, 8.3A, 9.3C	(10-70%) 6.1D, 6.9B, 8.1A, 8.2B, 8.3A
(0.5-2%) 6.1E, 6.3A, 6.4A	(0.5-5%) 6.1E, 6.3A, 6.4A, 8.1A, 9.1D	(2-10%) 6.1E, 8.1A, 8.2C, 8.3A	(0.5 - 10%) 6.1E, 6.9B, 8.1A, 8.2C, 8.3A
		(0.25 - 2%) 6.1E, 6.3A, 6.4A	

5 Operational Requirements

5.1 Basic Safety Rules

5.1.1 Students

- a) Students **shall** be supervised at all times in any area where hazardous substances are available for use.
- b) Students **shall** be dressed appropriately for hazardous substance being handled.
- c) Non-slip footwear, appropriate to the risk, **shall** be worn where hazardous substances are handled. Footwear **should** prevent any part of the foot from contacting the floor during sudden or unusual movement. Open sandals **shall** not be permitted for any procedure that requires students to handle Class 8.2A or 8.2B substances.
Note: Jandals shall not be permitted in laboratories. Class 8.2A and 8.3A are skin and eye corrosives with a pH of less than 2 or greater than 11.5. This includes most concentrated acids.
- d) Students **shall not** bring food or drink (including sipper bottles) into laboratories where hazardous substances are handled.
- e) Students **shall** wear safety glasses at all times when handling hazardous substances.
- f) Schools **may** include a requirement that students wear lab coats or aprons.

Example Dress Code for Students.

Students undertaking science courses may, from time to time, handle hazardous substances such as dilute acids and solvents. To keep safe, students shall keep to the following dress code.

- 1 You must wear closed shoes or roman sandals with a heel strap. Jandals or shoes that allow any part of the foot to come into contact with the floor are forbidden.
- 2 Tops should cover all of the torso and be tucked into your trousers or skirt.
- 3 Long hair must be tied back.
- 4 Head coverings are permitted but should be of cotton or flame resistant material. The head covering must be secured so that the material cannot come into contact with any part of the bench or science apparatus.
- 5 Your science teacher may require you to wear an apron or lab coat.
- 6 You must wear safety glasses at all times for any practical science activity.

5.1.2 Teaching Staff


- a) Appropriate protective clothing and equipment **shall** be worn when handling hazardous substances of the following hazard classifications: 6.1A-6.1D, 6.3A, 6.4A, 6.5A/B, 6.6A/B, 6.7A/B, 6.8A-C, 6.9A/B, and class 2, 3, 4, 5 and 8 substances. However, it is recommended that eye protection and a laboratory coat, overalls or similar protection **should** be worn at all times when working in the laboratory.
- b) Staff **shall** wear closed footwear when handling any Class 8.2A or 8.2B hazardous substance.
- c) Protective clothing **should** only be worn in any area where hazardous substances are handled.
- d) Laboratory coats **shall** be removed when going from laboratory areas to the tearooms or office areas.

5.1.3 General Safety Rules

- a) Food intended for human consumption **shall not** be consumed or stored where hazardous substances are handled.
- b) Food or drink for human consumption **shall not** be stored in a refrigerator used to store laboratory materials.
- c) Skin that has come into contact with hazardous substances (irrespective of the concentration) **shall** be washed.
- d) Hands **should** be washed after handling hazardous substances and before leaving the area where the hazardous substances were handled or used.

5.1.4 Inventory, information, labelling and containers

- a) A laboratory folder or file **shall** be kept in any area where hazardous substances are used. The folder **shall** keep information on the hazardous properties of the substances being used, safe methods of use, emergency information, and equipment required to handle the hazardous substance.
- b) The folder **shall** be stored so that any person in the laboratory is able to access the information within three minutes.
- c) The Laboratory Manager **shall** ensure that an accurate inventory is kept for of the location and quantity of all hazardous substances used in the laboratory.
*An acceptable method is to keep a classified inventory, which is updated annually, for each location where hazardous substances are stored. A copy of any orders for hazardous substances **should** be kept with the inventory or laboratory folder.*
- d) A copy of this information **should** be held at a second suitable location.
- e) Secondary containers of hazardous substances **shall** be labelled with:
 - the identity of the substance,
 - the concentration of the hazardous substance,
 - and an icon indicating the hazardous properties of a substance,
 - and, if possible, an indication of the precautions required when handling the substance. *An example of a container label is shown below.*

	<p>Acetic Acid</p> <p>2 mol.L⁻¹</p> <p>Wear Safety Glasses</p>
---	--

- f) All containers of hazardous substance *shall*:
- be able to contain the hazardous substance under normal operational conditions.
 - be resistant to the hazardous substance.
 - prevent entry by any organism capable of transporting the substance out of the laboratory.

5.2 Storage and handling

5.2.1 General Considerations

- Quantities of hazardous substances in the laboratory should be kept to a minimum and shall not exceed the total quantities listed in Appendix 1.
- The laboratory manager shall ensure that chemicals are segregated so that incompatible chemicals are separated.
- Winchesters of liquids shall be stored as near to ground level as practicable. Secondary containment should be provided.
An acceptable method of providing secondary containment is to place plastic-trays underneath corrosive substances and metal-trays under organic solvents. The trays should be capable of containing at least 25% of largest container, i.e.. 512 mL if storing 2.5 L Winchesters of chemical.
- Shelving and cabinets should be secured to prevent toppling during moderate earthquakes.
- Shelves should have lips or some other arrangement to prevent containers from falling off the shelves during an earthquake.
Lips should be 20-35 mm high, and can be made by any suitable method, e.g. curtain wire, Perspex lip screwed to shelf.
- All hazardous substances shall be stored on impervious surfaces.
An acceptable method of producing impervious surface is to use several coats of good quality Acrylic (non latex) paint, plastic coating or other impervious surface.
- A fume hood or fume cupboard or other means of ventilation, isolation or extraction shall be used when working with highly toxic, corrosive, volatile or odoriferous substances, or particulate/dusty matter.

- h) Safety carriers or trolleys (for large containers) shall be used for transporting plastic or glass containers of hazardous substances with a capacity of 2 litres or more. Note that incompatible substances shall not be carried in the same safety carrier and should be separated by trays on a trolley.

Chemical segregation

The purpose of segregation is to prevent inadvertent mixing of incompatible substances that might lead to a dangerous reaction. The distance required for segregation depends on the quantity of incompatible substances their mobility and the method of storage. An acceptable method of segregation is to ensure that:

- 1 Class 3 Flammable liquids are stored in a flammable liquids cabinet meeting AS:1940, separated from oxidisers, gases and aerosols by at least 3 metres, unless the incompatible chemicals are also stored in separate corrosives or chemical cabinet meeting AS:1940.
- 2 Class 4 flammable solids (e.g. sodium) may be stored in a locked wooden cupboard in suitable secondary containment.
- 3 Class 6 toxic substances should be kept within a secured cupboard in impervious containers.
- 4 Containers of other solid substances may be kept in alphabetical order on earthquake protected shelves.
- 5 Class sets of diluted hazardous substances, for example 0.1 molL⁻¹ HCl may be kept on trays on earthquake protected shelves.

Note: Appendix 4 lists hazard classes that are legally incompatible under HSNO control regulations. Further information and guidance on storage are available in "AS 2243:10 Safety in Laboratories: Storage of chemicals" or "AS 2982 Laboratory Construction" or in standard references.

5.2.2 Flammable Gases

- a) Portable LPG cylinders (for heating purposes) **shall not** be stored or used in school science laboratories.
- b) Flashback arresters **shall** be fitted to regulators attached to flammable gas bottles.
- c) Cylinders of flammable gases **should** only be stored in areas provided with adequate ventilation to ensure any leaked gas does not accumulate to levels that are 10% of the Lower Explosive Limit (LEL).
- d) Cylinders of all compressed gases **shall** be secured to a wall or fixed structure. A recommended method of securing cylinders is by two chains, at about 1/3 below the valve and at the base, to wall bracket.
- e) Oxygen cylinders **shall** be separated from any Class 2 Flammable gas by at least 5 metres.

5.2.3 Flammable Liquids

- a) Unless a flammable liquids cabinet meeting AS 1940 is available, a maximum of 20 litres aggregate total of all Class 3.1A to D substances **shall** be stored in any fire cell.

Notes:

- *A laboratory and prep room together would normally be one fire cell.*
- *Ethanol, Isopropyl Alcohol and Methanol are Class 3.1.B down to about 50 % dilution.*

- b) Up to 100 Litres of Class 3.1A to D *may* be stored in flammable liquids cabinet meeting AS 1940.
- c) The opening and decanting of all flammable liquids **should** be carried out in a suitable fume cupboard.
- d) If fume hood is not available, the “*person in charge*” **shall** ensure that all flammable liquids **shall** only be opened and poured:
 - in well ventilated location where flammable vapours *shall* not accumulate.
 - potential ignition sources are controlled.
- e) Containers **should** be opened for as short a time as possible and never near any source of ignition.
- f) In any one place, the duration that any container of flammable liquid is opened **shall not** exceed 10 minutes and the volume **should not** exceed 1500 mL decanted volume of any class 3.1A to 3.1C flammable liquid.

5.3 Emergency Planning

The Laboratory Manager shall ensure that information on the location, quantity and type of hazardous substances are included with the school Emergency Response Plan by:

- a) Keeping a copy of the Hazardous Substance Inventory(s) (S5.1.4) with the emergency plan.
- b) Mapping the location of hazardous substance stores and locations in a way that can be located by emergency services.
- c) Keeping paper copy of Safety Data Sheets for Class 6.1A,b and C (Acute toxins) Class 6.3A (Skin Irritant), 6.4A (Eye Irritant) 6.5A (Sensitiser), Class 8.2A (Skin Corrosive), 8.3A (Eye Corrosive).
*Note: The Safety Data sheets **should** contain information on the usual symptoms of exposure and a description of the first aid to be given to the person exposed to the substance.*
- d) Keeping paper copy of Safety Data Sheets for Category A Class 9 Ecotoxins.
*Note: The Safety Data Sheets for Class 9 **should** contain information on the effect of the substances on the environment and any immediate actions that **may** be taken to prevent the substance from entering the environment.*
- e) Ensuring that there is note of where additional information on the substances (for example 24 hour emergency service telephone number or internet URL) contained in a prominent place within the plan.
- f) Information in 5.3(a) above shall be available to emergency services at the location of the hazardous substances and from within one other easily identified location on the school premises (e.g. school reception).

Emergency planning

The purpose of emergency planning is to minimise the risk to persons and property in the event of a fire, earthquake, or other calamity.

To this end information on hazardous substances must be available to school and emergency personnel, for example NZ Fire Service.

Templates and guidance for the production of Emergency Response Plan are given on the Ministry of Education Web Site at:

www.minedu.govt.nz. (search for "Emergency Management")

This code only specifies the information about hazardous substances that must be included in the emergency plan.

The Board of Trustees/Governors or property manager shall ensure:

- a) A HAZCHEM sign approved by the local emergency services shall be affixed to the outside wall of locations that contain hazardous substances in such a way that the sign can be seen by the emergency services.
- b) An appropriate spill kit shall be kept within 30 metres of any location storing or using hazardous substances.
- c) Dry powder (or similar approved type) fire extinguishers shall be kept within five metres of any location that uses Class 2, 3 or 4 hazardous substances.
- d) That instructions are posted on the appropriate responses to:
 - Emergency response to fire or chemical spills.
 - Evacuation routes and assembly areas.

The principal of every school shall ensure that:

- a) The evacuation of students and the response to fire or other emergency are tested at least once a term.
- b) That the Emergency Response Plan is reviewed at least once a year.

5.4 Design requirements

The Board of Trustees/Governors **shall** ensure that any room (including prep rooms and storage areas), in which a hazardous substance is to be used:

- a) That all parts of the room that could come into contact with any hazardous substances **shall** be made of a material that is treated so that it is not capable of absorbing the hazardous substance; or
- b) Be covered by a disposable material that is capable of absorbing or retaining the substance.
- c) Meets any other requirement of the Building or Education Acts.

5.5. Protective Clothing Equipment

- a) Appropriate protective clothing and equipment **shall** be worn when handling hazardous substances of the following hazard classifications:
 - 6.1A-6.1D,
 - 6.3A,
 - 6.4A,
 - 6.5A/B,
 - 6.6A/B,
 - 6.7A/B,
 - 6.8A-C,
 - 6.9A/B,
 - and class 2, 3, 4, 5 and 8 substances.
- b) The following items **should** be available in the laboratory:
 - i. **Disposable Gloves** of material able to provide protection for the substances being used.
Note: A glove chart should be filed in the laboratory folder.
 - ii. **Eye Protection.**
Note:
 - A safety visor **should** be worn when decanting or handling more than 1 Litre Class 8.3A.
 - Safety Goggles **should** be worn when decanting or handling less than 1 litre of Class 8.3A substances.
 - Safety glasses with eye shields **should** be worn when decanting or handling any quantity of 8.3B or C hazardous substance.
 - iii. **Lab Coats** of fire resistant material.
Note: Synthetic material such as acrylic may burn fiercely if soaked in flammable liquids.
 - iv. **Disposable Dust Masks.**
*Note: Dust masks **shall** be stored in a sealed bag or container and only be used once.*
 - v. A **Cartridge Half-Mask Respirator** **shall** be stored in any laboratory that uses Class 6 substance having an inhalation hazard.
For example, a half mask respirator equipped with acid gas cartridges shall be available in any laboratory that uses formalin. Respirators should be

stored in sealed boxes, labelled with the users name, and the cartridges should be dated on opening and replaced six months after opening.

- c) The Laboratory Manager **shall** ensure that information on the use of protective clothing is kept in the laboratory folder.

Note: This information requirement can be met by providing this information in Laboratory Manuals or in the Safe Method of Use.

- d) Safety showers and/or eye wash facilities **shall** be provided within 10 m of where Class 8.2A, or Class 8.2B corrosive substances or any category A toxic substance are used.

5.5.3 Equipment and Apparatus used with Hazardous Substances

Every person who handles or uses any hazardous substance **shall** ensure:

- a) That all equipment used to handle or that comes into contact with a hazardous substance is properly maintained and operates so that the equipment does not leak, and
- b) that information on the use of the equipment is kept in the laboratory folder and available to all users within ten minutes, and
- c) that any equipment failures are reported to the Laboratory Manager.

5.5.4 Fume Cupboards and Local Ventilation.

Fume cupboards **should**:

- a) be designed to AS/NZS 2243.8 Safety in Laboratories: Fume Cupboards or NZS 7203: Fume Cupboards.
- b) Continue to operate after the hazardous substances have been removed from the cupboard, so that hazardous substances are flushed from the exhaust ducting.
- c) Have a means to indicate they are operating (such as a 'tell tale').
- d) Fume Hoods **shall not** be used to store closed containers of Hazardous Substances.
- e) Local ventilation systems **shall** be professionally designed to recognised standards and tested periodically to ensure effectiveness.

5.6 Disposal

- a) Substances ***shall*** be disposed in accordance with the Safe Method of Use developed for the substance. (Section 6)
- b) Waste hazardous substances, containers and packaging ***shall*** be disposed of in an appropriate way (See Appendix 6)

6. Safe Methods of Use

The following Safe Methods of Use SMOUS are general summaries of factors that should be considered before a class of substance is used in a school laboratory and controls that shall be in place for safe handling. The SMUs should be copied or printed and filed in a laboratory folder or equivalent, and in one other location where the information shall be available to emergency services.

The SMUs provide the general information required by section 2.3 (g) of this code. However, laboratory managers and persons in charge of hazardous substances should always seek more detailed information appropriate to the substances and procedures being used.

The teacher in charge shall provide a written specific Safe Method of Use (where this does not already exist) for any procedure utilising any category A hazardous substance or Class 6.1A to 6.1C hazardous substance.

The specific Safe Method of Use shall provide information on:

- The significant hazard of the substance (or procedure).
- Any required safety controls for the substance (or procedure).
- The Emergency Procedures for the substance (or procedure).
- The Disposal of the substance or products of the procedure.

Safe Method of Use for Class 3 Flammable liquids

HASNO Code	Examples
3.1 Flammable Liquids	Acetone, Ethanol
3.2 Liquid desensitised explosives	Prohibited in schools

Significant Hazards

- Fire or explosion.
- Excessive exposure may increase risk of chronic long-term health problems such as sensitisation, dermatitis and cancer.

Required Safety Controls

Fire:

- Unless a flammable liquids cabinet meeting AS 1940 is available, a maximum of 20 litres aggregate total of all Class 3.1A to D substances **shall** be stored in any fire cell.
Notes:
 - A laboratory and prep room together would normally be one fire cell.
 - Ethanol, Isopropyl alcohol and Methanol are Class 3.1.B down to about 50 % dilution.
- Up to 100 Litres of Class 3.1A to D **may** be stored in flammable liquids cabinet meeting AS 1940.
- The opening,⁷ and decanting of all flammable liquids **should** be carried out in a suitable fume cupboard.
- If fume hood is not available, the “person in charge” **shall** ensure that all Class 3.1A and 3.1B flammable liquids **shall** only be opened and poured:
 - in well ventilated location where flammable vapours **shall** not accumulate.
 - potential ignition sources are controlled.
 - containers **should** be opened for as short a time as possible and never near any source of ignition.
- In any one place, the duration that any container of flammable liquid is opened **shall not** exceed 10 minutes and the volume **should** not exceed 1500 mL decanted volume of any class 3.1A to 3.1C flammable liquid.
- Before pouring⁸, decanting, or pumping any flammable liquid from one metal container to another, connect the two containers and connect to a common earth. The resistance between the containers should not exceed 10 ohms.

⁷ Vapour concentrations should not exceed 10% of the Lower Explosive Limit (LEL) at any actual or potential ignition source

⁸ Note: Static can be generated by swirling, splashing, high flow rates, venturi effects, turbulence, cavitation or microfiltration. Minimising these effects shall reduce the static generated. Due care should be exercised when subjecting high purity flammable liquids (with low conductivities and a flash point of less than 10°C above ambient temperature) to any process that generates static

- g) The refilling or “topping up” of containers that contain, or have contained, flammable liquids, with a flash point of $< 35^{\circ}\text{C}$ (for example acetone) **shall**:
- be carried out in a fume cupboard; or
 - at a location where flammable vapours where ventilation ensures that the concentration of flammable vapour does not exceed 10% of the LEL at any actual or potential ignition source^{9 10}.

Microbiology

Where flame sterilization is required:

- No more than 50 mL of ethanol **shall** be used at any time. The container **shall** have a cover.
- The flame **shall** be as far as practicable from the ethanol container.
- The flame **shall** be turned off before refilling the container.
- A dry powder fire extinguisher **shall** be hung within 3 metres of the work area.

General Chemistry

Exposure to solvents will be kept as low as reasonably achievable.

The Laboratory Manager shall ensure:

- That the work can be completed in an area of adequate ventilation.
- Appropriate grade and material of gloves are available and used.
- That staff wear safety glasses and flame-resistant (e.g. cotton) lab coats at all times whilst using solvents.
- That appropriate masks and filters (e.g. 3M organic vapour) are available for staff.

electricity. [Suggested values are 10 Pico Siemens per metre for low flow rates. The potential for a fire or explosion is higher where there is a flammable atmosphere.

⁹ For example: Less than 0.5 mL of residual ethanol in a 2.5 litre Winchester can produce a saturated air/ethanol vapour mixture. Refilling a 2.5 litre Winchester that has held ethanol at 190C shall release 2.5 litres of a saturated ethanol vapour/air mixture. This can result in over 42 litres of flammable vapour.

Liquids with a higher vapour pressure and /or lower explosive limit shall produce a larger flammable zone.

¹⁰ Note: Pouring 100mL of ethanol into a clean dry 250 mL beaker produces very little if any flammable vapour, outside of the beaker.

Disposal

- Small volumes of water-soluble flammable liquids (ethanol acetic acid) *may* be diluted (at least 20 x volume) and sent to waste.
- Small volumes (<100 ml) of volatile organic solvents may be left to evaporate within a fume hood.
- Larger volumes should be accumulated and sent to a specialist waste contractor.

Waste Handling

Containers for collecting and storing hazardous substances wastes in laboratories:

- ***Shall*** not exceed 5 litres for category A substances or 20 litres for all other categories.
- ***Shall*** not be placed on the floor unless connected to analytical equipment
- ***Shall*** not be placed between benches, in walkways or corridors.
- ***Should*** be kept in a storage cabinet; safety containers that are self-closing and have a flash arrester are recommended for containers of >4L capacity.
- Containers of > 1L, not stored in storage cabinets ***shall*** be provided with secondary containment.

Emergency Information

Health Hazards

Skin	Eye	Inhalation	Ingestion
Wash with copious quantities of soap and water.	Wash with copious quantities of tepid (<25°C) water or saline, preferably aerated water. Seek immediate medical assistance.	Remove victim to fresh air. Provide oxygen if available.	Do not induce vomiting. Seek medical help.

Spills or reactivity

Minor Spill (less than 1 litre)	Major Spill (greater than 1 litre)
<p>Ensure there is adequate ventilation.</p> <p>Turn off all sources of ignition.</p> <p>Absorb onto suitable absorbent and remove absorbent or fume hood or take outside and allow to evaporate</p>	<p>Ensure there is adequate ventilation.</p> <p>Turn off all sources of ignition.</p> <p>Evacuate building.</p> <p>Call emergency services.</p>

Safe Method of Use for Class 4 Flammable Solids

(except 4.3 Dangerous when wet)

HASNO Code	Example
4.1.1 Flammable Solids	Aluminium Powder
4.1.2 Self Reactive Flammable Solids	Prohibited in Schools
4.1.3 Desensitised Explosives	Prohibited in Schools
4.2 Spontaneously combustible	Activated carbon, Calcium metal

Significant Hazards

- Ignition and addition to total fuel load.
- Spillage of material after an earthquake or mishandling accident.

Required Controls

- Keep quantities within laboratory as low as reasonably achievable.
- Check containers annually (at inventory).
- Restrict use to suitably qualified persons.
- Keep a dry powder fire extinguishers in any area where Class 4 substances are used and ensure that staff know how to use the extinguisher.

Personal protective equipment

- Wear safety glasses, gloves and laboratory coat before opening containers.
- Handle solid material with tongs or suitable spatulas.

Storage

- Store below eye level on earthquake-protected shelves or in locked cupboards.
- Store materials as per SDS recommendations.
- Keep segregated from flammable liquids, mineral acids, and oxidisers. Small quantities of Class 4 may be stored in flammable liquids cabinet provided containers are stored on a separate tray capable of containing a spill.

Disposal

Send to specialist company.

Emergency Information

Health Hazards

Skin	Eye	Inhalation	Ingestion
Remove clothing, brush surplus material from skin then rinse with copious quantities of water.	Wash with copious quantities of tepid water for at least 15 minutes. Occasionally lift lids. Seek immediate medical attention.	Remove to fresh air, seek medical attention.	Obtain medical attention.

Spills or reactivity

Spill (fragment)
<p>Remove ignition sources.</p> <p>Recover with tongs, if feasible, otherwise cover with inert material (e.g. sand, and sweep into container.</p> <p>Place in appropriate container under inert atmosphere.</p>

Safe Method of Use for Class 4.3, Dangerous when wet

HASNO Code	Examples
4.3A	Sodium, Calcium Carbide Potassium is prohibited for use in Schools

Significant Hazards

- Ignition and addition to total fuel load.
- Spillage of material after an earthquake or mishandling accident.

Required controls

- Keep a Dry Powder extinguishers in any area where Class 4.3 substances are used and ensure that staff know how to use the extinguisher
- Keep quantities within laboratory as low as reasonably achievable.
- Check containers annually (at inventory).
- Restrict use to suitably qualified persons.

Personal protective equipment

- Wear safety glasses, gloves and laboratory coat before opening containers.
- Handle metal with tongs

Storage

- Store below eye level on earthquake-protected shelves or in locked cupboards.
- Store under mineral oil or dried xylene or toluene.
- Keep sodium segregated from mineral acids, halogens halogenated hydrocarbons, sulphur oxides and phosphorous

Disposal

- Small quantities may be disposed of by experienced persons. Larger quantities should be sent to industrial chemical disposal company.

Emergency Information

Do **NOT** use water or carbon dioxide extinguishers on any fire or ignition that might involve Class 4.3 substances.

Health Hazards

Skin	Eye	Inhalation	Ingestion
Remove clothing, brush surplus material from skin then rinse with copious quantities of water.	Wash with copious quantities of tepid water for at least 15 minutes. Occasionally lift lids. Seek immediate medical attention.	Remove to fresh air, seek medical attention.	Obtain medical attention.

Spills or reactivity

Spill (fragment)
<p>Remove ignition sources.</p> <p>Recover with tongs, if feasible, otherwise cover with inert material (e.g. sand, and sweep into container.</p> <p>Place in appropriate container under inert atmosphere.</p>

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Safe Method of Use for Class 5.1. oxidisers

(except organic peroxides)

HASNO Code	Examples
5.1.1 (Liquid/solids)	Hydrogen peroxide, nitrates. Nitric Acid
5.1.2 (Oxidising gases)	Oxygen gas

Significant Hazards

- Contact with metals and organic liquids can lead to fire and explosions.
- Accelerant of fires in presence of additional fuel load.
- Trace impurities in Hydrogen peroxide can cause violent decomposition on heating.
- Liquids and solids are corrosives. Splashes to the eye can cause irreversible corneal damage and blindness.

Required Controls

- Limit the quantity stored in the lab as low as reasonably achievable.
- Use safety shields if using oxidisers in unknown reactions.

Personal protective equipment

- Wear safety glasses with side shields at all times.
- Wear safety goggles if decanting more than 250 ml of liquid oxidiser.
- Wear a full face safety visor if decanting more than 500 ml of Category A or B liquid oxidiser.

Storage

- Keep segregated from Class 3 and 4.
- Keep segregated from all halides, ammonia, hydrogen, and organic materials.
- Check containers annually (at inventory).

Disposal

- Dependent on specific substances.

Emergency Information

Health Hazards

Skin	Eye	Inhalation	Ingestion
Wash with copious quantities of water.	Irrigate with copious quantities of tepid water or saline, lifting eyelids occasionally. Seek immediate medical attention.	Remove to outside or ventilated area. Seek medical attention.	Do not induce vomiting. Seek medical attention.

Spills or reactivity

Minor Spill (less than 1 litre)	Major Spill (greater than 1 litre)
Control all sources of ignition. Absorb onto pillow of inert material. Remove to outside.	Evacuate area. Control all sources of ignition. Call emergency services.

Safe Method of Use for Class 6.1, Acute Toxicity¹¹

HASNO Code	Examples
6.1 Acute Toxins	<p>Most Acids, metal salts, zinc sulfate, barium and mercury salts.</p> <p>Class 6.1A B and C substances are prohibited from schools unless specifically listed in Appendix 1 of this code.</p>

Significant Hazards

- For high acute¹² hazards, DEATH may occur within seconds/minutes. In all cases, rescuers and treatment providers **SHALL** ensure their own safety before providing aid.
- Particular care is required where vapour, mist or gaseous hazards may be present. (For example Carbon Monoxide).

Required Controls

The **teacher in charge** for any procedure that uses Class 6 substance(s) **SHALL** ensure:

- All persons in the vicinity of the procedure are warned that a toxic substance is being used.
- All persons have the appropriate training (First Aid, Growsafe).
- That appropriate back up procedures are in place and tested before the work begins.
- That all appropriate antidotes are present on site in sufficient quantity.
- Secondary containers for Class 6.1A to 6.1C substances shall be marked with Class 6.1 Hazsub “Toxic” icon.

For example:

Fumigation of glasshouses or other facilities **SHALL** only be completed by personnel who have completed Applied Growsafe Training and who are wearing protective clothing and the correct respirator for the task.

¹¹ Specific Safe Methods of Use are required for chemical specie having toxicity less than:
 Oral toxicity < 300 mg/kg, bw LD50, Dermal <1000 mg/kg bw LD50, Gas <2,500 LC50 ppm in air,
 Vapour < 10 LC50 mg/L in air, Dusts/Mists < 1.0 LC50 mg/L in air

¹² An Acute Hazard is one to which a single exposure may cause harm, but which is unlikely to lead to permanent damage

Storage

- All Class 6.1A to 6.1C substances shall be kept in a secure area (e.g. locked cupboard) at all times when not in use.
- Areas of containment (including under-bench) cupboards shall be marked with toxic substances icon.
- Containers of Class 6.1A to 6.1C substances shall be stored on impervious surfaces.

Disposal

- The teacher in charge **SHALL** ensure that the disposal of any toxic substance conforms with conditions of any trade waste licence. Toxic substances that are disposed of to waste **SHALL** be treated (e.g. by dilution or chemical conversion) so that the toxic properties of the substance are above the threshold for Class 6.1.C.
- Class 6.1A to 6.1C substances that cannot be treated (for example Heavy metal salts) **SHALL** be packaged and disposed of using a recognised chemical disposal company.

Emergency Information

New Zealand Poisons Centre: 0800 764 766

Largely dependent on the species of chemical in use and type of exposure.

For most poisoning, use copious quantities of tepid water for surface exposures; however, some substances require special treatment.

In all cases seek medical help.

Health Hazards

Skin	Eye	Inhalation	Ingestion
Copious quantities of tepid water. Wash for at least 15 minutes.	Copious quantities of tepid aerated water (if available) followed by saline.	Remove from source of exposure. Give oxygen if available	Keep patient calm and quiet. Seek medical help. DO NOT INDUCE VOMITING

Spills or reactivity

Minor Spill (dependent on species)	Major Spill
<p>Solids and Liquids: Depending on species of chemical; most toxicants can be absorbed onto suitable material and packaged for disposal.</p> <p>For gases and vapours, provide ventilation where feasible.</p>	If in doubt, call emergency services

Safe Method of Use for Class 6.3 to 6.9, Chronic Toxicity¹³ e.g. Kerosene

HASNO Code	Examples
6.3 Skin Irritant	Kerosene, organic solvents
6.4 Eye Irritant	Ammonium persulfate
6.5 Sensitiser (respiratory and contact)	Potassium dichromate Formaldehyde
6.6 Mutagens	Lead Nitrate
6.7. Carcinogen	Napthalene Formaldehyde
6.8 Reproductive/Developmental	Cyclohexanol
6.9 Target Organ Systemic	Ethanal

Significant Hazards

Chronic¹⁴ hazards are grouped together as methods of control and treatment following exposure differs from acute hazards. In some circumstances, Skin and Eye Irritants may have more acute than chronic effects. Formalin is also an acute and a chronic toxin.

Required Controls

The **Teacher in Charge** for any procedure that uses Class 6.3 to 6.9 substances **shall**:

- Ensure all team members are informed of the nature of the hazard and any required control measures. In particular, ensure that women of childbearing age know the control measures required to minimise exposure to Class 6.8 (reproductive/developmental) or 6.6 (mutagens) substances.
- Check that appropriate protective equipment, (glove type, respirator and lab coat) is available before work commences.

¹³ Specific Safe Methods of Use are required for Class 6.1A to C (acute toxins) and Class 6.7A (known or presumed carcinogens)

Extreme care should be taken with class 6.8 (known or presumed reproductive or developmental toxins).

¹⁴ A chronic hazard is presented by a chemical that has the potential to cause long-term damage to health, often as a consequence of repeated or prolonged exposure to it.

- Ensure that all persons handling chronic toxicants wear appropriate personal protective equipment.
- All persons in the vicinity of the procedure are warned that a toxic substance is being used.
- All persons have the appropriate training (First Aid, Growsafe).
- That appropriate back-up procedures are in place and tested before the work begins.
- Secondary containers for Class 6.3A to 6.9.A substances shall be marked with Class 6 Hazsub "Toxic" icon.

For example:

- Nitrile gloves shall be worn when handling Acetone, Methanol.
- Latex gloves shall be worn when handling Acetaldehyde.

Storage

- All Class 6.3A to 6.9.A substances shall be kept within a locked room or cupboard.
- Areas of containment (including under-bench) cupboards shall be marked with toxic substances icon.
- Containers of Class 6.3A to 6.9.A substances shall be stored on impervious surfaces.

Disposal

The teacher in charge ***SHALL***:

- ensure that the disposal of any toxic substance conforms with conditions of any trade waste licence.
- that toxic substances disposed of to waste ***are*** treated (e.g. by dilution or chemical conversion) so that the toxic properties of substance are above the threshold for Class 6.1.C.
For example Acetic Acid may be treated by dilution and disposed of to waste water.
- Class 6.3A to 6.9.A substances that cannot be treated (for example heavy metal salts) ***SHALL*** be disposed of to a chemical disposal company.

Emergency Information

New Zealand Poisons Centre: 0800 764 766

Short term or brief exposure to low concentrations of substances known to cause chronic effects are unlikely to have long term consequences. Twenty cigarettes at age 14 does not guarantee lung cancer at age 40. Nevertheless, every effort should be made to minimise exposures.

In case of contact, use copious quantities of tepid water for surface exposures; in all cases seek medical help.

Health Hazards

Skin	Eye	Inhalation	Ingestion
Copious quantities of tepid water. Wash for at least 15 minutes.	Copious quantities of tepid aerated water (if available) followed by saline.	Remove from source of exposure. Give oxygen if available.	Keep patient calm and quiet. Seek medical help. DO NOT INDUCE VOMITING.

Spills or reactivity

Minor Spill (dependent on specie)	Major Spill
Solids and Liquids: Depending on specie of chemical, most substances can be absorbed onto suitable material, and packaged for disposal. For gases and vapours, provide ventilation if feasible.	If in doubt, call emergency services.

Safe Method of Use for Class 8 Corrosives

HASNO Class	Examples:
8.2 Skin Corrosives 8.3 Eye Corrosives	Nitric Acid Chlorine

Significant Hazards

- Cause severe burns on contact with any body tissue.
- Splashes to the eye may cause irreversible damage to the cornea.
- Inhalation causes severe damage to the respiratory system.

Required Controls

Personnel requirements

- Handling Category A corrosive substances shall be completed by persons authorised by laboratory manager.
- Decanting or handling quantities > 250mL of Category A corrosive substances *should* only take place in presence of other suitably qualified persons (do not work alone).

Personal protective equipment

- Decanting or handling quantities \leq 250 mL, wear safety glasses with side shields, lab coat, appropriate gloves.
- Decanting or handling quantities > 250mL < 1000 mL, wear safety goggles, lab coat, appropriate gloves.
- Decanting or handling quantities > 1000 mL, wear full-face visor, corrosive resistant apron, elbow length gloves.
- Use a bottle carrier to transport any quantity Class 8.2 or 8.3 substances between rooms.
- All areas that use or handle Class 8 substances shall be equipped with spill kit capable of handling a 2.5 Litre spill.

Storage

- All containers to be stored below eye level, on earthquake protected shelves.
- All containers to be stored on corrosive resistant, impermeable trays or shelving.
- Quantities > 20 L (total all corrosives) should be stored in standard approved Corrosives Cabinets.
- Quantities > 100 L (total all corrosives) to be stored in external dangerous goods store where feasible.

Disposal

Disposal of substances is dependent on nature and type of substance.

- For inorganic common acids and bases, (e.g. HCl, NaOH) and some organic acids (acetic acid) dilution to waste may be acceptable depending upon quantity to be disposed and the terms of any trade waste licence.
- For other organic acids, waste material shall be shipped to suitable agency for industrial neutralisation.

Emergency Information

Health Hazards

Contact with eyes	Contact with skin	Ingestion	Inhalation
<p>Wash with water for 15 minutes.</p> <p>Get checked by doctor as soon as possible.</p>	<p>Wash with copious quantities of tepid water.</p> <p>Wash with soapy water, rinse well.</p>	<p>Do not induce vomiting.</p> <p>It may be feasible to neutralise with suitable compound e.g. sodium bicarbonate, milk.</p> <p>In all cases Obtain IMMEDIATE medical assistance.</p>	<p>Go to well ventilated area away from fumes.</p> <p>Visit a doctor as soon as possible if respiratory problems occur.</p>

Spills or reactivity

For any inadvertent mixing producing fumes, evacuate area and call fire brigade.

Minor Spill (less than 10 litres)	Major Spill (greater than 10 litres)
<p>Depending on chemical knowledge of personnel and reactivity of chemicals, minor spills may be neutralised in house.</p>	<p>Call fire brigade.</p>

References

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Material Safety Data Sheets from:

[www.hazard.com/ msds/index.php](http://www.hazard.com/msds/index.php)

and

www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/index.htm

New Zealand Poisons Centre: 0800 764 766